CLAIMS

What is claimed is:

1. A gas turbine engine assembly comprising:

a compressor to compress intake air;

a combustor to combust fuel with compressed intake air;

a turbine section comprising a rotating turbine in flow communication with said combustor;

an air passage from said compressor to said turbine for supplying cooling air to said turbine;

a fuel air heat exchanger for transferring heat from air within said air passage to fuel within a fuel passage; and

a fuel deoxygenator for removing dissolved gases from said fuel.

2. The assembly of claim 1, wherein said fuel deoxygenator comprises a permeable membrane in contact with fuel flowing through said fuel passages.

3. The assembly of claim 2, comprising a polytetraflourethylene coating disposed on a fuel side of said permeable membrane.

4. The assembly of claim 2, comprising a porous substrate supporting said permeable membrane on a non-fuel side.

5. The assembly of claim 4, comprising a vacuum source in communication with said porous substrate for creating a partial pressure differential between a fuel side of said permeable membrane and a non-fuel side to draw dissolved gasses out of fuel with said fuel passage.

6. The assembly of claim 4, comprising a strip gas passage in communication with said porous substrate for creating a partial pressure differential between a fuel side of said permeable membrane and a non-fuel side to draw dissolved gases out of fuel within said fuel passage.

7. A cooling system for a gas turbine engine comprising:

a heat exchanger assembly comprising an air passage for cooling air in thermal communication with a fuel passage for fuel; and

a fuel deoxygenator for removing dissolved gases from said fuel to increase the heat absorption capacity of fuel.

8. The system of claim 7, comprising a compressor supplying air flow through said air passage.

9. The system of claim 7, wherein a temperature of fuel within said fuel passage is greater than 325 deg. F.

10. The system of claim 7, wherein fuel deoxygenator comprises a permeable membrane in contact with fuel flowing through said fuel passages.

11. The assembly of claim 10, comprising a polytetraflourethylene coating disposed on a fuel side of said permeable membrane.

12. The assembly of claim 11, comprising a porous substrate supporting said permeable membrane on a non-fuel side.

13. The assembly of claim 12, comprising a vacuum source in communication with said porous substrate for creating a partial pressure differential between a fuel side of said permeable membrane and a non-fuel side to draw dissolved gasses out of fuel with said fuel passage.

14. The assembly of claim 12, comprising a strip gas in communication with said porous substrate for creating a partial pressure differential between a fuel side of said permeable membrane and a non-fuel side to draw dissolved gases out of fuel within said fuel passage.

15. A method of cooling a gas turbine engine comprising the steps of:

a) directing air from a compressor through an air passage;

b) removing dissolved gases from within fuel flowing through a fuel passage;

c) rejecting heat from said air within said air passage to fuel flowing with said fuel passage to produce cooled air; and

d) flowing cooled air over the engine.

16. The method of claim 15, comprising flowing fuel adjacent a permeable membrane.

17. The method of claim 16, comprising supporting said permeable membrane on a non-fuel side with a porous substrate and creating a partial pressure differential between a fuel side and the non-fuel side of said permeable membrane for driving diffusing gases from fuel.

18. The method of clam 17, comprising creating said partial pressure differential with a vacuum source in communication with said porous substrate.

19. The method of claim 17, comprising flowing a strip gas in communication with said porous substrate for creating said partial differential.